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GEOLOGICAL RECONNAISSANCE OF NORTHERN YAMHILL AND SOUTHERN WASHINGTON COUNTIES, OREGON

November 23, 1941

1. Location of Area. The area covered by this report lies in Northern Yamhill County and Southern Washington County, Oregon, and is roughly bounded by lines connecting the towns of Beaverton, Hillsboro, Forest Grove, Cherry Grove, Yamhill, Carlton, Dundee, Newberg, Rex and back to Beaverton. It covers portions of the valleys of the Yamhill, Chehalem and Tualatin Rivers.

2. Purpose and Scope of the Work. The work was designed to determine whether or not the area had any definite oil possibilities and whether or not the structural conditions could be determined from surface data. Only one and one-half days were spent in the field which was entirely insufficient to cover the area in detail. But the general geological features of the area were determined and sufficient knowledge gained to guide future operations in the area.

3. Stratigraphy. While only Tertiary rocks are exposed at the surface in northwestern Oregon, it is entirely possible that they are underlain by rocks of Mesozoic Age. If such rocks form the pre-Tertiary basement of that area they might be of almost any type and in almost any condition. However, there is some reason to infer that such rocks would consist of marine sediments, at least in part, and that they might not be appreciably metamorphosed. Whatever they are, they have been covered by a great thickness of Tertiary sediments and volcanics ranging in age from Early Eocene to Miocene. In the Coast Ranges of Oregon and southwestern Washington these rocks have been uplifted and erosion has exposed many of the formations.

In the area covered by this report, the oldest exposed rocks are basic lavas of Late Eocene or Early Oligocene Age. They are found in the vicinity of Cherry Grove and southward from there in the basin of the Yamhill River. These rocks have been examined by the writer in other areas and they usually atain a thickness of many hundreds of feet. They are overlain with apparent conformity by marine sediments of Oligocene Age. These sediments consist of tuffaceous sandstones and clays that are sometimes fossiliferous. The exposed thickness in this area is probably more than 2000 feet although insufficient work was done to get any accurate idea on this matter. The thickness might be very much more than the figure given above. Certainly it can be little under it. Associated with these rocks and the underlying lavas are dense black crystalline lavas that

appear to be intrusive into them. They are probably diabases. Such rocks are known to be intrusive into them same formations not far away in the Coast Range and the Willamette Valley and to find them in this area is not surprising.

Overlying the Oligocene marine sediments with erosional disconformity are Miocene Basalts belonging to the Columbia River Formation. They form a capping on the Dundee Hills, Chehalem Ridge and probably Cooper Mountain and Bull Mountain. They consist of flows of varying thicknesses and are usually quite vesicular.

In a few places younger flows are found. They are to be correlated with the Rocky Butte Volcanics and are probably of Early Pliocene Age. They occur as isolated outcrops in the Tualatin Valley -- notably in the ridge near Farmington School.

Several types of Pliocene and Pleistocene sediments as well as recent alluvial deposits, are to be found in the area but these were not studied since, for the time being, they are unimportant to the problems under consideration.

4. Structural Features. Most of the dips observed in the area in both the lavas and the marine sediments are easterly. This is in accord with the general structural trends to the south in the western part of the Willamette Valley and to the north and northeast along the northeastern border of the Tualatin Valley. Thus this area, in a broad sense, lies on the eastern monoclinal flank of the Coast Range uplift. However, such dips are not always of the same magnitude nor do they always have the same strike. Some of these variations may be due to landsliding or hillside creep but others clearly are not. In ascending Scroggins Creek, northwest of Gaston, the dip increases from 15 to as much as 60 degrees in a relatively short distance. Along the south and west sides of Chehalem Ridge other variations in the attitudes of the marine sediments were noted. On the south slope of this ridge north of Newberg a dip of 35 degrees to the north was found. A short distance to the west the dip is approximately flat and even westerly dips were noted. In general the outcrops in which reliable dips can be measured are very scarce and it is doubtful if any accurate idea of the structural conditions can be determined from the outcrops. Of considerable interest is the escarpment-like steep south slope of Chehalem Ridge. The base of the Columbia River lavas in this ridge is much higher than in the Dundee Hills directly south. This fact, coupled with the erratic dips and the steep face of the ridge, strongly suggest a fault parallel to and at the foot of the south slope of the ridge.

While no definite anticlinal structures were found in the area and while it is recognized that the surface data are meagre, yet the writer is inclined to believe that sufficient detailed work would disclose whether or not there is anticlinal folding in the area. Even if such folding could be proven by surface mapping, there still remains the difficult

task of proving closures on the ends of such a structure. Any such anticline would probably extend northward beneath the Tualatin Valley where there are no exposures and perhaps also southward into the similarly flat valley of the Yamhill and Willamette Rivers.

5. Oil Possibilities. The main obstacle to the occurrence of oil in this area is the absence of known adequate source rocks in the Tertiary section. It is true that much of the Tertiary is composed of marine sediments and that many of the Eocene and Oligocene formations contain marine fossils. However, no such highly organic beds as are commonly found associated with oil bearing formations in other parts of the world have been found in the Tertiary section in Oregon. It is true that to the west in the Coast Range the lowermost Tertiary beds are not exposed and that such beds might be sufficiently organic to produce oil, but where such formations are exposed to the south and to the northeast they are not of a character to permit such an inference. Small globules of oil have been reliably reported found in vesicular lavas at Newport on the Oregon Coast to the southwest of the area, and on the north bank of the Columbia River near Ilwaco, Washington. The source of such oil is highly conjectural but it had to originate somewhere. Its presence burdens us with an interesting and somewhat embarrassing question. The writer will not attempt to answer it here but it is mentioned in order to emphasize the fact that the possibilities of accumulations in favorable structural traps in Tertiary sediments in western Oregon cannot be considered impossible. However, since no adequate source rocks are known in the Tertiary section, the search for such rocks must turn elsewhere. There are two alternate sources. One is Tertiary rocks beneath the ocean to the west of the Oregon and Washington coasts. From such a source the oil might have come by lateral migration. The other source is in older rocks buried beneath the Tertiary in northwestern Oregon and southwestern Washington. From these rocks the oil would have to come into the Tertiary beds by vertical migration. Examples of such an anomoly are at hand. In the Magdalena Valley of Colombia, South America, the entire Tertiary section is composed of sediments of continental origin. Below them are Organic marine Cretaceous rocks known to adequate as a source of oil. Oil is found as high in the Tertiary section as the Oligocene.

In regard to structural traps for the accumulation of oil in the area under consideration, the writer failed to find convincing evidence that such traps exist. The evidence, however, is largely lacking rather than negative. Nevertheless, since the general structural trend is monoclinal, the assumption must be made that no definite and pronounced anticlines exist. In this matter the question of searching for such structures by geophysical methods suggests itself. The writer is inclined, albeit with considerable hesitancy, to the belief that such methods might be dangerous when used in areas where the marine sediments are known to have been intruded by dikes, sills and other bodies of igneous rock. Such bodies could conceivably give favorable reactions where the actual conditions were decidedly unfavorable.

6. Conclusions. In view of the foregoing, the writer cannot say that the possibilities of securing commercial production of oil in this area are promising. If an anticline of adequate areal extent and definite and satisfactory closure could be proven in the area, a deep test of such a structure, if

carefully cored, would be exceedingly interesting and would add valuable data to the existing knowledge of the Tertiary stratigraphy of northwestern Oregon. As far as the data obtained by the writer is concerned, such a structure could exist in the eastern part of this area and in the Yamhill Valley to the south and the Tualatin Valley to the north, in both of which the subsurface structure is marked by undisturbed Pliocene (?) and Quaternary fill.

(Signed) Claire P. Holdredge